What is claimed is:

1. (Withdrawn) A beam splitter for splitting wavelengths of electromagnetic radiation comprising an optically transmissive element having first and second surfaces, said first surface being divided into first, second and third zones, said first zone having a first coating which, for said wavelengths, is substantially100% reflective, said second zone having a second coating which, for said wavelengths, is partially transmissive and partially reflective, said third zone having an anti-reflective coating being substantially 100% transmissive, said second zone being between said first and said third zone.

2. (Withdrawn) The beam splitter of claim 1, wherein said second surface has no anti-reflective coatings.

3. (Withdrawn) The beam splitter of claim 1, wherein said second surface has an anti-reflective coating.

4. (Withdrawn) The beam splitter of claim 1, wherein said second coating is, approximately, 50% reflective and 50% transmissive.

5. (Withdrawn) The beam splitter of claim 1, wherein said first and second surfaces are parallel to each other.

6. (Withdrawn) An optical system for dividing wavelengths of electromagnetic radiation into two portions, said system comprising:

a) a beam splitter, said beam splitter including an optically transmissive element having first and second surfaces, said first surface having first, second and third zones,

i) said first zone having a first coating which, for said wavelengths, is substantially 100% reflective,

ii) said second zone having a second coating which, for said wavelengths, divides said wavelengths into a reflected portion and a transmitted portion, and

iii) said third zone having a transmissive coating;

b) means for directing said wavelengths upon said second zone; and

c) first and second reflective means, said first and second reflective means being positioned relative to each other and said beam splitter such that,

i) said portion of said wavelengths reflected off said second zone is then reflected off said first reflective means, then reflected off said second reflective means, and then reflected off said first zone, and

ii) said portion of said wavelengths transmitted through said second zone is then reflected off said second reflective surface, then reflected off said first reflective surface, and then through said third zone

7. (Withdrawn) The optical system of claim 6, wherein said second zone is between said first and said third zone.

8. (Withdrawn) The optical system of claim 6, wherein said first and second reflective means are, respectively, first and second reflective surfaces.

9. (Withdrawn) The optical system of claim 6, wherein said second coating is, approximately, 50% reflective and 50% transmissive.

10. (Withdrawn) The optical system of claim 6, wherein said first and second surfaces are parallel.

11. (Withdrawn) The optical system of claim 6, wherein said reflected portion of said wavelengths constitutes a first diverging beam, wherein said transmitted portion of said wavelengths constitutes a second diverging beam, and further including optical means for converging and interfering both said transmitted portion and

said reflected portion of said wavelengths after said reflected portion of said wavelengths has been reflected off said first coating and said transmitted portion of said wavelengths has been transmitted through said third zone.

12. (Withdrawn) The optical system of claim 11, wherein said means for converging includes a Fourier lens.

13. (Withdrawn) The optical system of claim 12, wherein said means for converging further includes a cylindrical lens.

14. (Withdrawn) The optical system of claim 11, further including a detector sensitive to said wavelengths, said detector positioned at the location where said reflected portion of said wavelengths and said transmitted portion of said wavelengths interfere with each other.

15. (Currently Amended) In an optical instrument for producing a spectral and spatial image from ~~having means to process~~ wavelengths of electromagnetic radiation to produce an interferogram, said instrument comprising: an ~~at least one~~ optical path, an aperture positioned along said optical path to define one spatial dimension, means positioned along said optical path for splitting said wavelengths into reflected and transmitted portions of said optical path and subsequently recombining said reflected and transmitted portions, ~~and~~ means positioned along said optical path before said means for splitting and recombining for spectrally dispersing said wavelengths, said means for spectrally dispersing said wavelengths including a pair of gratings, ~~said means for spectrally dispersing and~~ said means for splitting and recombining said reflected and transmitted portions producing a combined beam containing lateral shear ~~first and second sets of spectrally dispersed beams~~, a detector positioned along said optical path, and means positioned along said optical path to create an interferogram for each spatial location from said aperture onto said detector ~~which can interfere with each other to produce a plurality of different fringes of different wavelengths. said means for dispersing said wavelengths including a pair of gratings~~.

16. (Original) The instrument of claim 15, wherein said gratings are reflective.

17. (Cancelled)

18. (Currently Amended) The instrument of claim 15 ~~17~~, wherein said gratings are positioned along said optical path in optical series with each other.

19. (Cancelled)

20. (Cancelled)

21. (Cancelled)

22. (Currently Amended) The instrument of claim 38 ~~20~~, wherein said at least one pair of gratings is in series with each other and said second pair of gratings is also in series with each other.

23. (Currently Amended) The instrument of claim 15, wherein said means for splitting and recombining includes a beam splitter positioned along said optical path for splitting said optical path into first and second optical path portions.

24. (Currently Amended) The instrument of claim 23, wherein said beam splitter includes ~~comprises~~ an optically transmissive element having a first surface ~~and second surfaces~~, said first surface being divided into first, second and third zones, said first zone having an anti-reflective ~~a first~~ coating[,] which, for said wavelengths, is substantially 100% transmissive ~~reflective~~, said second zone having a second coating which, for said wavelengths, is partially transmissive and partially reflective, said third zone having a third ~~an anti-reflective~~ coating which, for said wavelengths, is substantially 100% reflective, said second zone being between said first and said third zone.

25. (Cancelled)

26. (Cancelled)

27. (Currently Amended) The instrument ~~beam splitter~~ of claim 24, wherein said second coating on said first surface of said optically transmissive element of said beam splitter is, for said wavelengths, approximately, 50% reflective and 50% transmissive.

28. (Currently Amended) The instrument of claim 24, ~~further including:~~ wherein said means for splitting and recombining also includes first and second reflective means for recombining,

~~a)means for directing said wavelengths upon said second zone;~~

~~b)first and second reflective means,~~ said first and second reflective means being positioned relative to each other and said first, second and third zones of said first surface of said optically transmissive element of said beam splitter such that,

i) said portion of said wavelengths reflected off said second zone is the reflected off said first reflective means, then reflected off said second reflective means, and then reflected off said third ~~first~~ zone, and

ii) said portion of said wavelengths transmitted through said second zone is then reflected off said second reflective surface, then reflected off said first reflective surface, and then through said first ~~third~~ zone.

29. (Original) The instrument of claim 28, wherein said first and second reflective means are, respectively, first and second reflective surfaces.

30. (Cancelled)

31. (Cancelled)

32. (Cancelled)

33. (New) An optical instrument for producing a spectral and spatial image from wavelengths of electromagnetic radiation to produce an interferogram, said instrument comprising: an optical path, an aperture positioned along said optical path to define one spatial dimension, means positioned along said optical path for splitting said wavelengths into reflected and transmitted portions of said optical

path and subsequently recombining said reflected and transmitted portions, said means for splitting and recombining said reflected and transmitted portions producing a combined beam containing lateral shear, means positioned along said optical path after said means for splitting and recombining for spectrally dispersing said wavelengths, said means for spectrally dispersing said wavelengths including at least one pair of gratings, a detector positioned along said optical path, and means positioned along said optical path to create an interferogram for each spatial location from said aperture onto said detector.

34. (New) The instrument of claim 33, wherein said at least one pair of gratings are reflective.

35. (New) The instrument of claim 33, wherein said at least one pair of gratings are positioned along said optical path in optical series with each other.

36. (New) The instrument of claim 33, wherein said means for splitting and recombining includes a beam splitter including an optically transmissive element having a first surface, said first surface being divided into first, second and third zones, said first zone having an anti-reflective coating which, for said wavelengths, is substantially 100% transmissive, said second zone having a second coating which, for said wavelengths, is partially transmissive and partially reflective, said third zone having a third coating which, for said wavelengths, is substantially 100% reflective, said second zone being between said first and said third zone.

37. (New) This instrument of claim 36, wherein said second coating on said first surface of said optically transmissive element of said beam splitter is, for said wavelengths, approximately, 50% reflective and 50% transmissive.

38. (New) The instrument of claim 33, further including a second pair of gratings positioned along said optical path after said means for splitting and recombining said wavelengths, said at least one pair of gratings positioned in said reflected

portion of said optical path, said second pair of gratings positioned in said transmitted portion of said optical path.